

Project Engineering Design: 04-SC-002-PED, 04-05
Construction: 04-CH-108-0
BNL Center for Functional Nanomaterials,
Brookhaven National Laboratory, Upton, New York

(Changes from FY 2003 Congressional Budget Request are denoted with a vertical line [] in the left margin.)

Significant Changes

1. Construction Schedule History

	Fiscal Quarter				Total Estimated Cost (\$000)	Total Project Cost (\$000)
	A-E Work Initiated	A-E Work Completed	Physical Construction Start	Physical Construction Complete		
FY 2004 Budget Request	2Q 2004	1Q 2005	3Q 2005	1Q 2008	85,000	85,300

2. Financial Schedule

(dollars in thousands)

Fiscal Year	Appropriations	Obligations	Costs
PROJECT ENGINEERING & DESIGN (PED)			
2004	4,100	4,100	3,200
2005	1,400	1,400	2,300
CONSTRUCTION			
2004	0	0	0
2005	21,500	21,500	13,000
2006	42,800	42,800	34,600
2007	15,200	15,200	26,100
2008	0	0	5,800

3. Project Description, Justification and Scope

Project Description

This project will establish a Nanoscale Science Research Center (NSRC) at BNL. The scientific theme of the BNL Center for Functional Nanomaterials (CFN) is 'atomic tailoring of functional nanomaterials to achieve a specific response'. The CFN will be a user facility designed to provide a wide range of tools for the preparation and characterization of nanomaterials. The CFN will seek to integrate these unique capabilities with other BNL facilities, including the broad range of synchrotron characterization techniques available at the National Synchrotron Light Source (NSLS).

An 85,000 SF two-story facility is planned to include offices, laboratories, and scientific equipment. The structure will be located in proximity to the NSLS, the Materials Science Dept., the Instrumentation Division, and the Physics Dept, and a short distance from Chemistry. By focusing the efforts of organizations within BNL, the CFN will promote interdisciplinary work on nanomaterials synthesis and characterization, serving as a focal point for collaborations among BNL staff and the user community.

Justification

The mission of the Office of Basic Energy Sciences (BES) at DOE is to foster and support fundamental research in focused areas of the natural sciences in order to expand the scientific foundations for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. The BES NSET report concluded that NSRCs were essential for conducting research in support of these DOE missions. The BNL Center for Functional Nanomaterials will complement the other NSRCs proposed as part of the DOE nationwide initiative in nanoscale research. The intent is to provide a nanoscience user facility serving universities and research institutions. Significant new opportunities for materials and chemical nanoscience research at BNL will be available to CFN users.

The design and scope of the CFN will fulfill DOE mission needs and incorporate input from potential users, gained through many channels including outreach efforts such as workshops. An essential component of the project is to establish an organizational infrastructure open to external users based on peer review. In this way a truly national nanomaterials effort can create breakthrough opportunities. The laboratory areas are organized into seven 'clusters' established to provide the necessary primary user service. Cluster functions cover a wide range of physical and chemical synthesis and characterization. They are designated Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, Theory and Computing, and CFN Endstations at NSLS. The CFN will allow users to control processes, tailoring the properties of materials structured on the nanoscale. Some of these materials, all relevant to the BES mission, include piezoelectrics, ferroelectrics, organic films and conductors, magnetic nanocomposites, and catalysts.

Scope

This effort will begin with preliminary engineering (Title I) and detailed engineering design (Title II) necessary to construct a BNL Center for Functional Nanomaterials. The engineering effort includes all engineering phase activities, including field investigation, preliminary design, specifications and drawings for conventional construction, final design, preparation of procurement documents for experimental equipment, and construction/equipment procurement estimates.

The completed design will enable construction of a new two-story Laboratory/Office building of approximately 85,000 gross SF. The facility will include clean rooms, general laboratories, wet and dry Science/Basic Energy Science

laboratories for sample preparation, fabrication, and analysis. Included will be some of the equipment necessary to explore, manipulate and fabricate nanoscale materials and structures. Also included are individual offices and landscape office areas, seminar area, transient user space for visiting collaborators with access to computer terminals, conference areas on both floors, and vending/lounge areas. In addition it will include circulation/ancillary space, including mechanical equipment area, toilet rooms, corridors, and other support spaces.

The new Laboratory/Office building will consist of a structural steel frame with bays of metal decks with concrete fill, all supported on reinforced concrete footings and foundations. The ground floor will contain vibration isolated concrete slabs for clean room and optics laboratories and a partial concrete slab on grade. The roof will be metal deck with roof insulation and a 4-ply membrane roofing system. Exterior wall treatment will be insulated metal panels and operable double-glazed aluminum windows complimenting the exterior of the existing adjacent NSLS. Utilities will include steam and condensate; electrical power; communication; fiber-optic data-link; fire protection and detection; sanitary system; potable water; and storm water drainage.

Technical procurement for the project will include laboratory equipment for the CFN laboratory clusters Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, and Theory and Computing as well as for the cluster designated CFN Endstations at the NSLS.

The building will incorporate human factors into its design to encourage peer interactions and collaborative interchange by BNL staff and CFN users and visitors. In addition to flexible office and laboratory space it will provide “interaction areas”, a seminar room and a lunch room for informal discussions. This design approach is considered state-of-the-art in research facility design as it leverages opportunities for the free and open exchange of ideas essential to creative research processes.

4. Details of Cost Estimate^a

	(dollars in thousands)	
	Current Estimate	Previous Estimate
Design Phase		
Preliminary and Final Design costs (Design Drawings and Specifications at \$2,340K)	3,850	NA
Project Management costs (1.2% of TEC)	1,010	
Total, Design Costs (5.7% of TEC)	4,860	
Construction Phase		
Technical Facilities		
Equipment.....	33,450	
Inspection, design & project liaison, testing, checkout and acceptance	650	
Project Management (1.3% of TEC).....	1,105	
Total, Technical Costs	35,205	
Conventional Facilities		
Improvements to Land	890	
Building Construction.....	22,790	
Site Utilities	3,660	
Standard Equipment.....	1,315	
Removal less salvage.....	0	
Inspection, design & project liaison, testing, checkout and acceptance	960	
Project Management (0.8% of TEC).....	710	
Total, Construction Costs	30,325	
Contingencies		
Design Phase (0.7% of TEC).....	600	
Construction Phase (16.5% of TEC).....	14,010	
Total Line Item Cost	85,000	
Less: Non-Agency Contribution.....	0	
Total, Line Item Costs (TEC)	85,000	NA

^aThe annual escalation rates assumed for FY 2004 through FY 2007 are 2.5, 2.9, 2.8, and 2.6 percent, respectively, using DOE FY 2004 Guidance, January 2002 Update.

5. Method of Performance

Design and inspection of the facilities and equipment will be by the operating contractor and A/E subcontractor as appropriate. Technical construction will be competitively bid, lump sum contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

6. Schedule of Project Funding

(dollars in thousands)							
Prior Years	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	Total	
Project Cost							
Facility Cost							
Design.....	0	3,200	2,300	0	0	0	5,500
Construction.....	0	0	13,000	34,600	26,100	5,800	79,500
Total, Line Item TEC.....	0	3,200	15,300	34,600	26,100	5,800	85,000
Plant, Engineering, and Design (PE&D) ..	0	0	0	0	0	0	0
Operating expense funded equipment.....	0	0	0	0	0	0	0
Total Facility Costs (Federal and Non-Federal)	0	3,200	15,300	34,600	26,100	5,800	85,000
Other Project Costs							
Conceptual design cost ^a	280	0	0	0	0	0	280
NEPA Documentation Costs.....	10	0	0	0	0	0	10
Other ES&H costs.....	0	0	0	0	0	0	0
Other project-related costs	10	0	0	0	0	0	10
Total, Other Project Costs	300	0	0	0	0	0	300
Total, Project Costs	300	3,200	15,300	34,600	26,100	5,800	85,300
Less: Non-Agency Contribution.....	0	0	0	0	0	0	0
Total, Project Cost (TPC)	300	3,200	15,300	34,600	26,100	5,800	85,300

^aConceptual design — No narrative required.

7. Related Annual Funding Requirements

(FY 2007 dollars in thousands)		
	Current Estimate	Previous Estimate
Annual facility operating costs	19,340	NA
Annual facility maintenance/repair costs	0	NA
Utility costs	660	NA
Total related annual funding	0	NA
Total operating costs (starting in FY07 after CD-4A).....	20,000	NA

8. Design and Construction of Federal Facilities

“All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and DOE Orders. The total estimated cost of the project includes the cost of measures necessary to assure compliance with Executive Order 12088, “Federal Compliance with Pollution Control Standards”; section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41 CFR 101-19.6”